REMARKS

Attorney for Applicants has carefully reviewed the outstanding Office Action on the above-identified application.

Claims 1-56 are currently pending in the present application. Claims 2-15, 20-31, and 35-46 were indicated in the Office Action as containing allowable subject matter. Claims 1-3, 16-19, 32-34, and 47-56 were rejected as being anticipated by U.S. Patent No. 5,500,530 to Gregoris. For the reasons set forth herein, Applicant respectfully traverses this rejection, and asserts that all of the pending claims are patentable over Gregoris.

Applicant's claimed invention relates to methods for detecting ice and liquid water on surfaces. In the first embodiment, a reflectance spectrum from a surface to be tested is measured using a near-infrared optical imaging system, and **the midpoint wavelength of the transition (or step) of the measured reflectance spectrum (near 1.4 microns) is calculated.** The midpoint wavelength is then compared to a decision threshold wavelength to determine the presence of liquid water or ice on the surface. In the second embodiment, **at least three reflectance levels are measured at three wavelengths**, and a decision function is applied to the measured reflectance levels. If the output of the decision function is within a first range, the presence of liquid water on the surface is indicated. If the output is within a second range, the presence of ice on the surface is indicated. If the output is between the first and second ranges, the absence of ice or water on the surface is indicated.

Gregoris disclose an electro-optic ice detection system for determining the presence of ice on an aircraft wing. The intensity of light in a band between 1.16 to 1.20 microns is determined, as well as the intensity of light in a band between 1.24 and 1.28 microns. A contrast (ratio) is determined by calculating the difference between the intensities over a sum of the intensities. If the contrast is positive, an indication of ice on the wing is generated. If the contrast is negative, the absence of ice is indicated.

As a preliminary observation, the ice detection method disclosed in Gregoris is entirely different than the ice and water detection methods of the present invention. The Gregoris method involves measuring two intensities in two bands of light in a reflectance spectrum, and determining a ratio of the difference between the intensities over a sum of the intensities. The present invention, in contrast, involves no such processing. Rather, in one embodiment according to the present invention, a midpoint wavelength of a transition (or "step") in a reflectance spectrum is calculated, and the result compared to a decision threshold wavelength to determine the presence or absence of ice or water on a surface. As defined in the specification, the transition (or "step") corresponds to the short-wavelength edge of the absorption band near 1.4 micrometers of a reflectance spectrum (see, e.g., page 4, lines 5-7 of the specification). In another embodiment, at least three reflectance levels in at least three wavelength bands are measured, and a decision function is applied to the reflectance levels to determine the presence or absence of ice or water on a surface.

Gregoris fails to disclose each element of Applicant's claimed invention, as set forth in Claims 1-16 and 17-32. Each of these claims recites the steps of **calculating a midpoint**

wavelength of a transition in the reflectance spectrum; and comparing the midpoint wavelength to a decision threshold wavelength. The Office Action points to FIG. 1 and col. 5, lines 44-65 of Gregoris as disclosing such features. However, a careful read of both FIG. 1 and col. 5, lines 44-65 reveals no such features. FIG. 1 of Gregoris merely discloses the effective spectral reflectivities of ice and water. Absolutely no disclosure is provided of calculating a midpoint wavelength of a transition in a reflectance spectrum, much less comparing the results of such a calculation to a decision threshold wavelength. Col. 5, lines 44-65 of Gregoris, as well as the remainder of Gregoris, is equally devoid of any such disclosure. Col. 5, lines 44-65 merely describes a process for comparing light intensities in two bands for the purpose of *calibrating* the device prior to detecting ice on a surface, so as to correct for non-ideal illumination conditions. No mention is made of calculating a midpoint wavelength of a transition threshold in a reflectance spectrum, much less comparing the midpoint to a decision threshold wavelength to determine the presence or absence of ice or water on a surface. As such, Applicant submits that Claims 1-16 and 17-32 are patentable over Gregoris.

Gregoris also fails to disclose each element of Claims 33-46. Each of these claims recite the steps of **calculating a midpoint wavelength of a transition using three reflectance levels; indicating the presence of ice on the surface if output of the decision function falls within a first pre-determined range; and indicating the presence of liquid water on the surface if output of the decision function falls within a second pre-determined range.** Gregoris is wholly devoid of any disclosure relating to such steps. Rather, Gregoris merely discloses measuring intensities in two reflectance bands, and generating a contrast (ratio) between the difference and sum of the measured intensities. Absolutely no disclosure is provided for

measuring three reflectance levels, much less calculating a midpoint wavelength of a transition using three reflectance levels and comparing the midpoint wavelength to two, pre-defined ranges to determine the presence or absence of water or ice on a surface, as set forth in Claims 33-46. Accordingly, Applicant submits that Claims 33-46 are patentable over Gregoris.

For similar reasons, Applicant submits that Claims 47-56 are patentable over Gregoris. Each of these claims recites the limitations of **a detector for detecting at least three reflectance levels *Ra, Rb,* and *Rc* at three wavelengths *a, b,* and *c*; and a signal processor having a decision function for determining the presence of ice or water on the surface based upon the at least three reflectance levels *Ra, Rb,* and *Rc***. The Office Action points to elements 18 and 30a-30c of FIG. 6 and column 5, lines 44-65 as disclosing such features. Elements 18 and 30a-30c of FIG. 6 of Gregoris relate to an image processor and three detectors, wherein intensity signals in a lower band, and upper band, and a reference band are generated. However, col. 5, lines 44-65 explicitly states that intensity signals in only two bands (i.e., in the upper and lower bands of Gregoris) are used to determine the presence of ice on a surface, via a contrast calculation. Specifically, col. 5, lines 61-65, states "the processor determines the contrast **as the difference in the intensities between the lower and upper band signals over the sum of the intensitites of these band signals**." (emphasis added). As such, Gregoris is entirely devoid of any disclosure relating to a signal processor having a decision function for determining the presence or absence of ice or water on a surface *using at least three reflectance levels*, as set forth Claims 47-56. Accordingly, Applicant submits that Claims 47-56 are patentable over Gregoris.

All issues raised in the Office Action are believed to have been addressed. Claims 1-56 are pending and are in condition for allowance. No new matter is believed to have been added. Re-examination is requested and favorable action solicited.

Respectfully submitted,

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